

The Institute for Advanced Technology

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CONTROL DATA

CORPORATION

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THE COURSE: Integer programming is a product of the last 12 years. This powerful, versatile tool is at present the most rapidly developing area of mathematical programming. The seminar will survey the types of problems that can be formulated, though often not in a straightforward way, as integer programs. It will discuss, with numerical examples, the main techniques used today for solving pure and mixed integer programs, their power and limitations. It will present information on available computer codes, reported results and a number of practical applications. A brief review of some recent research topics will be given at the end.

WHO SHOULD ATTEND: A two-day seminar for operations research analysts, practitioners of management science, systems analysts, computer scientists, engineers and economists, interested in optimization techniques in general and mathematical programming in particular. Participants should have a background in elementary linear algebra and in linear programming. No knowledge of integer programming itself is required.

COURSE OUTLINE

The Modeling Potential of Integer Programming

- Discontinuities; discrete variables; binary decisions
- Disjunctive and conditional constraints
- Non-convex piece-wise linear functions
- Special structures: matching, covering, set covering
- Sequencing: traveling salesman-type problems

Cutting Plane Methods

- Geometry of integer programming
- Generating cuts
- Gomory's cyclic algorithm

The all-integer algorithm
Application to aircraft crew scheduling

Implicit Enumeration Methods

- Searching the solution-graph
- "Depth first" versus "breadth first"
- Exclusion tests, bounds
- Surrogate constraints
- Applications to capital budgeting, industrial development planning

Mixed-Integer Programming Techniques

- Duality in integer programming
- Partitioning procedures
- Implicit enumeration in the mixed case
- A branch and bound algorithm
- Applications to location problems, pipeline network planning

Brief Review of Some Recent Developments

- Group-theoretic approach
- Intersection cuts

The right to cancel the seminar or to amend the syllabus is reserved.

THE INSTRUCTOR:



DR. EGON BALAS is Professor of Industrial Administration and Applied Mathematics at Carnegie-Mellon University (Pittsburgh, Pennsylvania). Dr. Balas is a leading authority on integer programming. His name is closely associated with the development of implicit enumeration (branch and bound) methods,

which constitute a basic building-block of the more efficient computer codes in use today for the solution of problems like capital budgeting, optimization of R & D projects, plant location, etc. Other areas in which he has done extensive research, reported in more than 50 publications, include scheduling and sequencing, networks, decomposition (mathematical techniques for decentralizing economic systems), distribution-type problems, etc. Dr. Balas is an Associate Editor of Operations Research. He also acts as a consultant, and has worked in this capacity for Control Data Corporation and IBM, as well as for firms in the steel, oil, timber, textile, and building industries.

LOCATION: Seminars are conducted at the hotels listed below. Cost of hotel rooms is not included in the registration. IAT does not arrange hotel reservations; however, the hotels will hold a block of rooms for seminar participants until two weeks before the seminar. Hotel reservation cards will be forwarded with registration confirmations. Please contact the hotels directly for reservations, mentioning, IAT, Control Data Corporation; the seminar; and dates attending.

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February 9-10, 1971
The Barbizon-Plaza Hotel
106 Central Park South
New York, New York 10019



March 2-3, 1971
Sheraton-Silver Spring
8727 Colesville Road
Silver Spring, Maryland 20910



April 6-7, 1971
The Barbizon-Plaza Hotel
106 Central Park South
New York, New York 10019

The Sheraton-Silver Spring is a mile from the Capital Beltway and is easily accessible to the entire metropolitan area and by direct limousine service to Washington airports. The hotel offers free parking to seminar participants.

REGISTRATION: Registration, including course materials and luncheons, is \$225 for the first participant and \$200 for others from the same organization. Checks for registration should be made payable to The Institute for Advanced Technology. Classes will begin at 9:00 a.m. and end at 5:00 p.m. daily.

OTHER SUBJECTS:

Introduction to the Design of Experiments
Data Analysis - A Survey of Techniques
Model Building Symposium
Sales and Business Forecasting
Multivariate Analysis of Marketing Data
Business Planning Symposium
Management Information Systems
Basic Systems and Procedures Including
Data Processing Concepts
Advanced Management Systems Analysis
Information Management Symposium
Microfilm Information Systems
Management of Data Processing Projects
Operating Systems
Data Base and File Organization
Documentation and Debugging
Hospital and Medical Information Systems
Computer-Assisted Instruction
Design of Data Communications Systems
Advanced Computer Techniques
Data { Capture - Entry - Collection
Communication - Gathering
Organization
Advanced EDP System Design Techniques

OTHER PROGRAMS: As an extension to the publicly offered program, The Institute for Advanced Technology offers seminars at the clients' premises or at special IAT facilities. The presentation of special sessions may be a replica of the regularly scheduled program, or they may be specially tailored to meet clients' requirements.

ABOUT IAT: The Institute for Advanced Technology is a directorate of Control Data Education Institutes. The nature of computer-based methods makes education an integral part of Control Data operations. The Institute provides education in computer, management, mathematical and statistical sciences. Faculty members are drawn primarily from the ranks of Control Data Corporation's professional staff. The curriculum consists of subjects in which these professionals are experts—recognized for excellence in day-to-day application of the art and science of computer usage to the real problems of business and industry. This teacher-doer relationship is formalized in The Institute for Advanced Technology. Sharing these skills through seminars in major cities and special in-plant training programs is the goal of The Institute for Advanced Technology.

For further information, or to be placed on the mailing list for future announcements, write:

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The Institute for Advanced Technology

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—presents—

INTEGER PROGRAMMING

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● April 6-7, 1971
New York, New York

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